REMARKS/ARGUMENTS

Claims 1-18 were previously pending in the application. Claims 3, 9, 12, and 18 are amended, and new claims 19-20 are added herein. Support for the amendments to claims 9 and 18 is found, for example, in Fig. 2, while support for the amendments to claims 3 and 12 and for new claims 19-20 is found, for example, in original claims 3 and 12, step 112 of Fig. 1, and step 218 of Fig. 2. Assuming the entry of this amendment, claims 1-20 are now pending in the application. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Claim Rejections

In paragraph 1 of the office action, the Examiner rejected claims 1-18 under 35 U.S.C. 103(a) as being unpatentable over Kang in view of Chudak. For the following reasons, the Applicant submits that all of the pending claims are allowable over the cited references.

Claims 1 and 10

According to method claim 1, one or more demands for service in a mesh network are received, which network comprises a plurality of nodes interconnected by a plurality of links. Each of the one or more demands is mapped onto a primary path and a restoration path in the network to generate at least one path plan for the one or more demands in the network. The at least one path plan is generated as a function of (a) one or more cost criteria associated with the at least one path plan and (b) a failure-related cross-connection criterion associated with the path plan.

In rejecting claim 1, the Examiner stated, in paragraph 2, that Kang discloses generating at least one path plan as a function of one or more cost criteria associated with the at least one path plan. The Examiner admitted that "Kang fails to disclose a failure-related cross-connection criterion associated with the path plan."

Instead, the Examiner relies on Chudak as teaching the features of claim 1 that are missing from Kang. In particular, the Examiner stated that "Chudak teaches method for allocating protection bandwidth in a telecommunication mesh network," where "Chudak teaches a failure-related cross-connection criterion associated with the path plan."

The Examiner argued that it would have been obvious "to modify Kang's method a failure-related cross-connection criterion associated with the path plan." According to the Examiner, "The motivation to establish such criteria is that it minimizes real time switch ... that it minimizes unnecessary real time switches during failures."

For the following reasons, the Applicant submits that the combination of Kang and Chudak is improper and that the rejection of claim 1 based on that combination are therefore improper.

Chudak teaches a technique in which pre-cross-connected trails are associated with working paths in a telecommunications mesh network. See, e.g., column 5, lines 36-38. A pre-cross-connected trail is defined to be a trail of nodes connected by links such that, for each intermediate node, the two corresponding links are either intact or pre-cross-connected prior to the failure of the corresponding working path. See, e.g., column 17, line 65, to column 18, line 11. The purpose of using pre-cross-connected trails is to provide protection paths in a mesh network with fast protection switching capabilities. See, e.g., column 3, lines 19-22.

According to the Examiner, the motivation to combine Chudak and Kang is to provide fast real-time switching by minimizing unnecessary real-time switches during failures. If the Examiner's motivation is fast protection switching, then Chudak's technique already provides fast protection

switching and there would be no reason for a person of ordinary skill in the art to look to Kang. As such, there is no proper motivation to combine the teachings of Kang and Chudak.

Since there is no proper motivation to combine the teachings of Kang and Chudak, the rejection of claim 1 based on such a combination is improper and should be withdrawn. For similar reasons, the Applicant submits that the rejection of claim 10 is also improper and should be withdrawn.

In view of the foregoing, the Applicant submits that claims 1 and 10 are allowable over the cited references. Since claims 2-9 and 11-20 depend variously from claims 1 and 10, it is further submitted that those claims are also allowable over the cited references.

Claims 2 and 11

According to claim 2, the at least one path plan is generated by calculating (1) a first set of one or more path plans that satisfy the one or more cost criteria and (2) a second set of one or more path plans that satisfy the failure-related cross-connection criterion. A determination is made as to whether the first and second sets have any path plans in common. If not, then, until the first and second sets have at least one path plan in common, the one or more cost criteria are relaxed and the first set is recalculated.

In rejecting claim 2, the Examiner cited Kang as teaching the step of calculating a first set of one or more path plans that satisfy one or more cost criteria and Chudak as teaching the step of calculating a second set of one or more path plans that satisfy the failure-related cross-connection criterion.

The Examiner stated that Chudak teaches the step of determining whether the first and second sets have any path plans in common, citing column 6, lines 55-60; column 9, lines 45-55; and Figs. 10A and 10B as showing "cost and the cross-connection criterion matching." For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings in Chudak in rejecting claim 2.

Column 6, lines 55-60, of Chudak states:

> "The fundamental components of the networks we consider are the topology, the traffic demands, the allocation plan for these traffic demands, and the cross-connection table for the topology. The physical topology is represented by a graph G. Associated with each edge in G is a capacity (either OC-48 or OC-192) and a length."

Column 9, lines 45-55, of Chudak states:

> "For a cross- connection table to be feasible, it must satisfy the following two conditions. An OC-48 edge must never be connected to an OC-192 edge. If e_1 and e_2 are incident at a node v and the connection between them is either intact or pre-cross-connected, and e is an edge different from e_2 that is incident to e_1 at v, then the cross-connection table must indicate that e and e_1 are not connected (and similarly with the roles of e_1 and e_2 reversed). We call this condition the matching condition."

Chudak's Figs. 10A and 10B illustrate block diagrams for providing a budget-constrained minimum-cost-path determination. See, e.g., column 4, lines 59-60.

The Applicant does not understand how these teachings in Chudak relate to a step of determining whether two different sets of path plans have any path plans in common. At most, these teachings in Chudak relate to the calculation of a single set of path plans based on multiple criteria. There is no teaching or even suggestion in Chudak for the calculation of two different sets of path plans based on two different sets of criteria and then comparing those two different sets of path plans to determine whether they have any path plans in common.

The Applicant notes that, if Chudak truly taught what the Examiner argued that Chudak teaches, then the Examiner would not have needed to rely on Kang at all to reject either of claims 1 or 2. The fact is that Chudak does not teach or even suggest the determination of whether two different sets of path plans have any path plans in common, where one of the sets is calculated to satisfy one or more cost criteria, while the other set is calculated to satisfy a failure-related cross-connection criterion.

The Examiner also stated that those same citations in Chudak teach the step of relaxing the one or more cost criteria and recalculating the first set, if the first and second sets do not have any path plans in common, where the cost criteria are continued to be relaxed until the two sets have at least one path plan in common. Here, too, the Applicant submits that the Examiner mischaracterized the teachings in Chudak. In fact, none of the teachings cited by the Examiner teach or even suggest the relaxation of any cost criteria, let alone the relaxation of cost criteria until two different sets of path plans have at least one path plan in common.

The Applicant submits that this provides additional reasons for the allowability of claim 2 and similarly of claim 11 (and therefore claims 3-4 and 12-13, which depend from claims 2 and 11, respectively) over the cited references.

Claims 3, 12, and 19-20

According to original claim 3, the failure-related cross-connection criterion specifies a maximum number of cross-connections that are changed in any node in the network following a failure in the network, wherein a path plan does not satisfy the failure-related cross-connection criterion if the number of failure-related cross-connections that are changed in any node in the path plan following a failure in the network exceeds the specified maximum number. In rejecting original claim 3, the Examiner cited Chudak's Fig. 11 and column 18, lines 23-24. For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings in Chudak in rejecting claim 3.

Chudak's Fig. 11 illustrates a block diagram of an example of a pre-cross-connected trail. See, e.g., column 4, lines 61-62. Column 18, lines 23-24, of Chudak states: "Then there would be six PXT's, each containing a different edge," where PXT stands for "pre-cross-connection trail" (see, e.g., column 3, lines 36-37). These teachings in Chudak have nothing to do with a maximum number of cross-connections.

Furthermore, according to the explicit claim language, the failure-related cross-connection criterion specifies a maximum number of cross-connections that are changed in any node in the network following a failure in the network. Chudak's technique is related to the establishment of pre-cross-connections, i.e., cross-connections that are established before any failure occurs in the network. Chudak does not have anything to do with specifying a maximum number of cross-connections that are changed in any node in a network following a failure in the network.

The Applicant submits that this provides additional reasons for the allowability of claim 3 and similarly of claim 12 and new claims 19-20 over the cited references.

Claims 5 and 14

According to claim 5, two or more path plans are generated by calculating (step (a)) a set of node-disjoint path pairs for the one or more demands based on the failure-related cross-connection criterion, wherein a node-disjoint path pair is calculated for each demand. Primary and restoration paths are identified (step (b)) for each node-disjoint path pair in the set to generate a path plan for the one or more demands. A determination is made (step (c)) as to whether the path plan satisfies

the failure-related cross-connection criterion. When the path plan satisfies the failure-related cross-connection criterion, the path plan is saved (step (d)). Steps (a)-(d) are repeated (step (e)) to generate two or more path plans that satisfy the failure-related cross-connection criterion. One of the path plans is selected (step (f)) based on the one or more cost criteria.

Thus, claim 5 recites a method in which two or more different path plans are generated for a set of one or more demands, where each different path plan includes a primary path and a restoration path for each of the demands and all of the path plans satisfy a failure-related cross-connection criterion. When there are two or more demands, it is possible for the primary and restoration paths for the individual demands to satisfy the failure-related cross-connection criterion, while the path plan (which takes into account all of the paths for all of the demands) fails the failure-related cross-connection criterion. That is why claim 5 includes step (c) of determining whether the path plan satisfies the failure-related cross-connection criterion, even though step (a) explicitly calculated node-disjoint path pairs for the individual demands that satisfy the failure-related cross-connection criterion.

In rejecting claim 5, the Examiner cited Chudak as teaching all of the features explicitly recited in claim 5. For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings in Chudak in rejecting claim 5.

Chudak's technique involves establishing pre-cross-connection trails (PXTs) in a mesh network and then running a cost-based algorithm, such as a constrained Dijkstra algorithm, based on the PXTs, to determine a shortest admissible protection path for a working path in the network. See, e.g., column 3, lines 34-38. In Chudak, the PXTs are first established, and then the constrained Dijkstra algorithm is implemented to determine a protection path.

The only teaching in Chudak that can be interpreted as being an example of a failure-related cross-connection criterion is the establishment of the pre-cross-connection trails (PXTs). However, Chudak's PXTs are very different from the paths of claim 5 that are generated based on a failure-related cross-connection criterion. Chudak's PXTs are not paths that connect source and destination nodes; they are merely trails (i.e., incomplete paths) that are interconnected to form full paths only when the constrained Dijkstra algorithm is implemented.

These differences between Chudak's PXTs and the path pairs of claim 5 explain why Chudak does not teach all of the steps of claim 5. For example, Chudak does not teach or even suggest step (c) of determining whether a path plan satisfies a failure-related cross-connection criterion, where the path plan is generated by identifying primary and restoration paths for each node-disjoint path pair that corresponds to each of one or more demands, where the individual path pairs already satisfy the failure-related cross-connection criterion. One reason why Chudak does not suggest such a step as step (c) is that, in Chudak, there is no notion of individual path pairs satisfying a failure-related cross-connection criterion, while a path plan made up of multiple path pairs fails the failure-related cross-connection criterion.

In rejecting claim 5, the Examiner cited column 11, lines 1-20, of Chudak as teaching an example of step (c). This passage in Chudak has nothing to do with Chudak's pre-cross-connections. Rather, this passage relates to Chudak's allocation plan (see, e.g., column 10, lines 63-64 ("We now specify a sample allocation plan for these demands."), which is independent of Chudak's pre-cross-connections. See, e.g., column 9, lines 55-58 ("For an allocation plan and a cross-connection table (considered together) to be feasible, each of them must be feasible by itself, and they must also satisfy some further conditions so as to be consistent with each other.") See also column 18, lines 25-33, which explicitly teaches that some allocation plans are not pre-cross-connectable.

Since Chudak does not teach or even suggest an example of step (c) of claim 5 (as properly interpreted in context with steps (a) and (b) of claim 5), the Applicant submits that this provides additional reasons for the allowability of claim 5 and similarly of claim 14 (as well as claims 6-9 and 15-18, which depend variously from claims 5 and 14) over the cited references.

Claims 7 and 16

According to claim 7, steps (b)-(d) of claim 5 are repeated only until the path plan fails the failure-related cross-connection criterion. In rejecting claim 7, the Examiner cited column 16, lines 60-67, of Chudak as teaching the feature of claim 7. For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings in Chudak in rejecting claim 7.

Column 16, lines 60-67, of Chudak relate to the application of a budget constraint, which states that the sum (Σ) of the lengths (l(e)) of the edges (e) in a path (P) must be less than or equal to a distance budget (D). This has absolutely nothing to do with Chudak's failure-related cross-connection criterion.

Furthermore, in Chudak, a path plan cannot fail Chudak's failure-related cross-connection criterion. In Chudak, the failure-related cross-connection criterion is first used to establish pre-cross-connection trails that are then interconnected to form Chudak's path plan. In Chudak, a path plan cannot be generated that fails Chudak's failure-related cross-connection criterion because, in Chudak, the failure-related cross-connection criterion is applied before any path plans are generated.

The Applicant submits that this provides additional reasons for the allowability of claim 7 and similarly of claim 16 over the cited references.

Claims 9 and 18

According to claim 9, when calculating a set of node-disjoint path pairs for the one or more demands per step (a) fails to find a feasible solution, the failure-related cross-connection criterion is relaxed and steps (a)-(e) are repeated using the relaxed failure-related cross-connection criterion. In rejecting claim 9, the Examiner cited column 18, lines 30-35, of Chudak. For the following reasons, the Applicant submits that the Examiner mischaracterized the teachings in Chudak in rejecting claim 9.

Column 18, lines 30-35, of Chudak has nothing to do with relaxing a failure-related cross-connection criterion. According to that passage, not all allocation plans are pre-cross-connectable. There is no notion in Chudak of relaxing a failure-related cross-connection criterion. Either an allocation is pre-cross-connectable or it is not pre-cross-connectable.

Furthermore, as described above, in Chudak, the failure-related cross-connection criterion is applied in establishing pre-cross-connection trails before any node-disjoint path pairs are generated. In Chudak, there is no notion of relaxing the failure-related cross-connection criterion and then recalculating a set of node-disjoint path pairs using the relaxed failure-related cross-connection criterion.

The Applicant submits that this provides additional reasons for the allowability of claim 9 and similarly of claim 18 over the cited references.

Conclusion

For the reasons set forth above, the Applicant respectfully submits that the rejections of claims 1-18 under Section 103(a) have been overcome. The Applicant submits further that new claims 19-20 patentably define over the cited references.

In view of the above remarks, the Applicant believes that the pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Fees

During the pendency of this application, the Commissioner for Patents is hereby authorized to charge payment of any filing fees for presentation of extra claims under 37 CFR 1.16 and any patent application processing fees under 37 CFR 1.17 or credit any overpayment to Mendelsohn & Associates, P.C. Deposit Account No. 50-0782.

The Commissioner for Patents is hereby authorized to treat any concurrent or future reply, requiring a petition for extension of time under 37 CFR 1.136 for its timely submission, as incorporating a petition for extension of time for the appropriate length of time if not submitted with the reply.

Respectfully submitted,

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